

Preface

Zeolites, with their crystalline microporous structures, are cordial hosts to a wide variety of guests. However, it was the abrupt and unexpected departure of one of these *guests* (water) from a *host* (stilbite) on heating which led Cronstedt, in 1756, to coin the term "zeolite" (from the Greek meaning "boiling stone") to describe this material. Since that time, approximately 40 different naturally-occurring zeolites have been discovered on earth. Recent studies of meteorite compositions have shown that these guest-host materials (e.g., sodalite) occur in other parts of the universe as well. However, it wasn't until the twentieth century that synthetic routes to zeolites and other non-aluminosilicate molecular sieves were discovered. In addition, with the development of X-ray diffraction and the various spectroscopies, better understanding of the nature of the cavities, cages, and channels of these materials has led to the industrial exploitation of their guest-host properties. The world of zeolites has now expanded into a greater than 2 billion pound per year business, with major applications in detergent formulations, catalysis, and as adsorbents and desiccants. Their economic impact is difficult to determine; however, the improvement in gasoline yields alone (from catalytic cracking) must account for hundreds of billions of dollars in increased GDP.

In this volume, we have brought together a sampling of recent developments in various areas of guest-host or inclusion chemistry in zeolites. With the relevant chemical literature straining at the seams - there are over 44,000 references to "zeolite" or "molecular sieve" in Chemical Abstracts since 1967 - we have tried to include what we consider to be some of the more recent and leading-edge work in the field. Contributions on structure-direction in synthesis, characterizational techniques, computational aspects, coordination and organometallic chemistry, photochemistry, and electronic and optical materials illustrate the diversity and wide utility of this facet of inclusion chemistry. The breadth of information presented will, hopefully, inspire the creative reader to realize the title of this volume and to actually produce some novel "*nanoscale materials by design*".

Finally, we would like to thank the authors for their thoughtful contributions (and their patience with us in assembling this volume) as well as the DuPont Company for providing the time and facilities for completion of this project. The assistance of Ms. Nina Paglia Urban and Mr. Jack Jensen in the technical assembly of the manuscripts is greatly appreciated.

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March 1995